

1     **CLAIMS:**

2     What is claimed, is:

3     (1)   A compiler apparatus for optimizing exception handling in a target program as a  
4     program to be compiled, comprising:

5     an exception handler detection section for detecting, from exception handlers that catch  
6     exceptions thrown in said target program, a multiple-catching exception handler that  
7     catches a plurality of different exceptions and rethrow the caught exceptions;

8     an exception selection section for selecting a set of exceptions that are to be shifted to  
9     common processing through rethrow of the exception by said multiple-catching exception  
10    handler from among said plurality of exceptions caught by said multiple-catching  
11    exception handler detected; and

12    an exception handler throw section for throwing a clone exception handler that catches  
13    the set of exceptions selected by said exception selection section instead of said  
14    multiple-catching exception handler and shifting it to said common processing.

15    (2)   The compiler apparatus according to Claim 1, wherein said exception handler throw  
16    section throws a branch instruction for causing a shift to said common processing in said  
17    clone exception handler and causes a shift to said common processing with said branch  
18    instruction thrown.

19    (3)   The compiler apparatus according to Claim 1, wherein said exception selection  
20    section selects a set of exceptions whose frequency of throw in said multiple-catching  
21    exception handler is more than a predetermined reference frequency and which is shifted  
22    to said common processing.

1 (4) The compiler apparatus according to Claim 3, wherein, as a frequency with which  
2 exceptions are thrown in said multiple-catching exception handler, said exception  
3 selection section detects the number of times that any of said set of exceptions is thrown  
4 in said multiple-catching exception handler per the number of execution of said  
5 multiple-catching exception handler.

6 (5) The compiler apparatus according to Claim 1, wherein

7 said common processing includes catching exceptions that are thrown while processing a  
8 function that has been called with a function call outside said function call;

9 said multiple-catching exception handler catches exceptions inside said function call; and

10 said exception selection section selects said set of exceptions further on condition that  
11 depth of nesting of function call from said common processing down to said  
12 multiple-catching exception handler is more than a predetermined number.

13 (6) The compiler apparatus according to Claim 1, wherein the exception selection  
14 section selects the set of exceptions further on condition that the number of other  
15 exception handlers through which processing shifts from the multiple-catching exception  
16 handler to the common processing is more than a predetermined number.

17 (7) The compiler apparatus according to Claim 1, wherein

18 said common processing includes catching exceptions that are thrown while processing a  
19 function that has been called with a function call outside said function call;

20 said multiple-catching exception handler catches exceptions inside said function call; and

21 said exception selection section selects said set of exceptions further based on depth of

1     nesting of function call from said common processing down to said multiple-catching  
2     exception handler and the number of other exception handlers through which processing  
3     shifts from said multiple-catching exception handler to said common processing.

4     (8)   The compiler apparatus according to Claim 1, wherein

5     said exception handler detection section detects two said multiple-catching exception  
6     handlers: one said multiple-catching exception handler and another said multiple-catching  
7     exception handler for catching at least one exception thrown in said one multiple-catching  
8     exception handler;

9     said exception selection section selects a set of exceptions to be shifted to said common  
10    processing by rethrowing an exception caught in said another multiple-catching exception  
11    handler from among a plurality of exceptions caught by said one multiple-catching  
12    exception handler; and

13    said exception handler throw section throws each of two said clone exception handlers  
14    that correspond to each of said two multiple-catching exception handlers and causes each  
15    of said corresponding two clone exception handlers to catch the set of exceptions selected  
16    by said exception selection section instead of each of said two multiple-catching  
17    exception handlers.

18    (9)   A compiler program for causing a computer to function as a compiler apparatus that  
19    optimizes exception handling in a target program as a program to be compiled, said  
20    compiler program causing said computer to function as

21    an exception handler detection section for detecting, from exception handlers that catch  
22    exceptions thrown in said target program, a multiple-catching exception handler that  
23    catches a plurality of different exceptions and rethrow the caught exceptions;

1 an exception selection section for selecting a set of exceptions that are to be shifted to  
2 common processing through rethrow of the exceptions by the multiple-catching exception  
3 handler from among said plurality of exceptions caught by said multiple-catching  
4 exception handler detected; and

5 an exception handler throw section for throwing a clone exception handler that catches  
6 the set of exceptions selected by said exception selection section instead of said  
7 multiple-catching exception handler and shifting it to said common processing.

8 (10) The compiler program according to Claim 9, wherein

9 said common processing includes catching exceptions that are thrown while processing a  
10 function that has been called with a function call outside said function call;

11 said multiple-catching exception handler catches exceptions inside said function call; and

12 said exception selection section selects said set of exceptions further based on depth of  
13 nesting of function call from said common processing down to said multiple-catching  
14 exception handler and the number of other exception handlers through which processing  
15 shifts from said multiple-catching exception handler to said common processing.

16 (11) The compiler program according to Claim 9, wherein

17 said exception handler detection section detects two said multiple-catching exception  
18 handlers: one said multiple-catching exception handler and another said multiple-catching  
19 exception handler for catching at least one exception thrown in said one multiple-catching  
20 exception handler;

21 said exception selection section selects a set of exceptions to be shifted to said common  
22 processing by rethrowing an exception caught in said another multiple-catching exception

1 handler from among a plurality of exceptions caught by said one multiple-catching  
2 exception handler; and

3 said exception handler throw section throws each of two said clone exception handlers  
4 that correspond to each of said two multiple-catching exception handlers and causes each  
5 of said corresponding two clone exception handlers to catch the set of exceptions selected  
6 by said exception selection section instead of each of said two multiple-catching  
7 exception handlers.

8 (12) A recording medium having the compiler program according to Claim 11 recorded  
9 thereon.

10 (13) A compiling method for causing a computer to operate as a compiler apparatus that  
11 optimizes exception handling in a target program as a program to be compiled,  
12 comprising:

13 detecting, from exception handlers that catch exceptions thrown in said target program;

14 catching a plurality of different exceptions and rethrowing the caught exceptions;

15 selecting a set of exceptions that are to be shifted to common processing through rethrow  
16 of the exceptions from among said plurality of exceptions caught; and

17 throwing a clone exception handler catching the set of exceptions selected by said step of  
18 selecting; and

19 shifting the set of exceptions to said common processing.

20 (14) An article of manufacture comprising a computer usable medium having computer  
21 readable program code means embodied therein for causing optimization of exception

1 handling in a target program as a program to be compiled, the computer readable program  
2 code means in said article of manufacture comprising computer readable program code  
3 means for causing a computer to effect the steps of claim 13.

4 (15) A program storage device readable by machine, tangibly embodying a program of  
5 instructions executable by the machine to perform method steps for optimizing exception  
6 handling in a target program as a program to be compiled, said method steps comprising  
7 the steps of claim 13.

8 (16) A computer program product comprising a computer usable medium having  
9 computer readable program code means embodied therein for causing optimization of  
10 exception handling in a target program as a program to be compiled, the computer  
11 readable program code means in said computer program product comprising computer  
12 readable program code means for causing a computer to effect the functions of claim 1.